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Title	A REVISION OF THE FERN APHIDS OF JAPAN WITH DESCRIPTIONS OF THREE NEW SPECIES (HOMOPTERA : APHIDIDAE)
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Citation	INSECTA MATSUMURANA, 31(3): 13-24
Issue Date	1968-10
Doc URL	http://hdl.handle.net/2115/9761
Right	
Type	bulletin
Additional Information	



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A REVISION OF THE FERN APHIDS OF JAPAN WITH DESCRIPTIONS OF THREE NEW SPECIES (HOMOPTERA : APHIDIDAE)

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In the course of the present study have been known to occur in Japan 10 species of fern aphids, of which 3 are new to science. The type specimens of the new species described hereinafter are deposited in the Entomological Institute, Hokkaido University.

Before going further, I wish to express my sincere gratitude to Prof. C. Watanabe of the Entomological Institute, Hokkaido University, for his constant kind guidance. I am especially obliged to Dr. D. Hille Ris Lambers of Bennekom, Netherlands, and Dr. V. F. Eastop of the British Museum (Nat. Hist.), London, for their kindness in giving helpful suggestions or in offering valuable specimens for comparison.

Key to the Japanese species of fern aphids (Apterous viviparous females)

1. Tarsi of all legs much reduced, without claws. *Shinjia pteridifoliae* (Shinji)
- Tarsi normal. 2
2. Siphunculi reticulated at apex, wholly black. Tergum of abdomen strongly reticulated, the reticulation being ridged. 3
- Siphunculi not reticulated at apex, at least pale on basal half. Tergum of abdomen smooth, wrinkled or only reticulated weakly. 4
3. Thorax and abdomen with dark sclerites at bases of dorsal setae. Head with dorsal setae over 1.3 times as long as middle breadth of 3rd antennal segment.
- Thorax and abdomen without sclerites at bases of dorsal setae. Head with dorsal setae at most about as long as middle breadth of 3rd antennal segment.
- *Macromyzus woodwardiae* (Takahashi)
- *Macromyzus polypodicola* (Takahashi)
4. Antennae without secondary rhinaria. Head spinulose dorsally and ventrally, with diverging antennal tubercles. *Micromyzodium polypodii* Takahashi
- Antennae with secondary rhinaria. Head smooth or scabrous on dorsum, if scabrous then the antennal tubercles strongly converging. 5
5. Siphunculi cylindrical. Antennae and tibiae wholly black. 6
- Siphunculi swollen. Antennae and tibiae pale basally. 7
6. Antennae with 3rd segment shorter than head across eyes, the processus terminalis being 2.5–3.5 times as long as base of 6th segment. Cauda elongate and rounded at apex, over twice as long as broad. *Micromyzus osmundae* Takahashi
- Antennae with 3rd segment longer than head across eyes, the processus terminalis being 4–5 times as long as base of 6th segment. Cauda shortly triangular, about 1.4 times as long as

- broad. *Micromyzus nikkoensis*, sp. n.
7. Head scabrous dorsally, with strongly converging antennal tubercles. Body small, less than 2 mm. in length. *Utamphorophora filicis*, sp. n.
- Head smooth dorsally, with parallel or diverging antennal tubercles. Body large, more than 3 mm. in length. 8
8. Antennae with 10-17 rhinaria on 3rd segment. Femora scabrous on apical 1/3. Siphunculi with basal cylindrical part more than 3 times as long as smallest breadth of the part. *Amphorophora ampullata* Buckton
- Antennae with 19-27 rhinaria on 3rd segment. Femora scabrous on apical 2/3 or more. Siphunculi with basal cylindrical part less than 3 times as long as smallest breadth of the part. *Amphorophora scabripes*, sp. n.

1. ***Amphorophora ampullata* Buckton**

Amphorophora ampullata Buckton, Monogr. British Aphides 1: 187, 1876.

Rhopalosiphum ampullata: van der Goot, Beitr. Kennt. Holländischen Blattläuse p. 142, 1915.

Amphorophora ampullata: Hille Ris Lambers, Temminckia 8: 231, 1949; idem, Ent. Bericht., Deel 26: 14, 1966.

Megoura dryopteridis Matsumura, Trans. Sapporo Nat. Hist. Soc. 7(1): 13, 1918. **Syn. n.**

Amphorophora shidai Shinji, Zool. Mag. 45(538): 348, 1933. **Syn. n.**

Amphorophora shidai: Shinji, Monogr. Japanese Aphididae p. 765, 1941.

Amphorophora dryopteridis: Moritsu, Mushi 18(13): 83, 1948; Paik, Aphids of Korea p. 73, 1965.

On the basis of the present material a redescription will be given below.

Apterous viviparous female. Body green or yellowish green in life. Eyes orange red to dark red. Antennae pale; 3rd-5th segments at apex and 6th fuscous. Legs pale; femora and tibiae at apex and tarsi black. Siphunculi pale with apex black. Cauda pale yellow. Body 3.3-4.6 mm. in length excluding cauda.

Antennal tubercles large, diverging, smooth or spinulose, with 1 or 2, sometimes 3 setae apically and 2-4 setae ventrally, and usually with a distinct swelling ventrally. Antennae 1.2-1.6 times as long as body; 3rd segment with 10-17 rhinaria; 6th segment with processus terminalis about 4-6 times as long as base; 3rd-6th segments as 61:57:45:12+63 in length. Mandibular laminae with 6-8 setae; clypeus with 5-7 anterior setae. Rostrum hardly or just reaching hind coxae; ultimate segment 1.0-1.2 times as long as 2nd segment of hind tarsus, with 8 secondary setae. Femora scabrous on apical 1/3, with stout pointed setae at most about 1/3 of middle breadth of hind femur; tibiae imbricated at apex, with setae at most a little longer than middle breadth of hind tibia; 2nd segment of hind tarsus 0.13-0.15 mm., rarely up to 0.18 mm. in length. Abdomen membraneous, smooth or slightly wrinkled; 2nd-4th segments with 7-10 short blunt setae in addition to marginal ones, the longer setae being 0.3-0.7 times as long as middle breadth of 3rd antennal segment; 7th segment with 5-7 setae including marginal ones; 8th segment with 7-9 setae. Siphunculi mostly smooth, corrugated below well-developed flange, swollen on apical 1/2-2/3, 2.0-2.3 times as long as cauda, and 1/5-1/4 of body length, the basal cylindrical part being about 3.5-6.5 times as long as smallest breadth of the part. Cauda obtuse, 1.5-1.8 times as long as broad, with 14-24 setae.

Measurements in mm. Body 4.17; head across eyes 0.82; antennal segments (1st-6th): 0.29, 0.17, 1.56, 1.25, 1.00, 0.30+1.65; ultimate rostral segment 0.18; hind femur 2.12; hind tibia 3.95; 2nd segment of hind tarsus 0.17; siphunculus 0.97; cauda 0.43;

longest dorsal seta 0.07 on head, 0.03 on anterior part of abdomen, 0.06 on 8th abdominal segment.

Alate viviparous female. Differs from the apterous viviparous female as follows:—

Abdomen green in life. Head and thorax brownish. Antennae black; 3rd segment pale at extreme base. Legs black; femora at base and tibiae at middle pale. Siphunculi black with basal cylindrical part pale. Cauda pale. Body 4.0 mm. in length excluding cauda.

Antennae with 3rd segment bearing 43–45 rhinaria along its whole length. Wings of normal venation, with some fine pointed setae along hind margin of stigma, the setae being much shorter than middle breadth of 3rd antennal segment. Abdomen

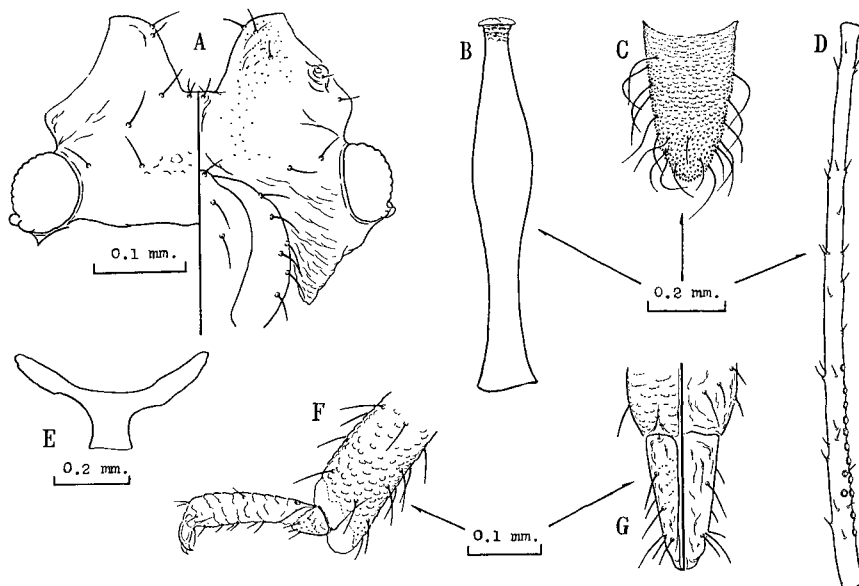


Fig. 1. *Amphorophora ampullata* Buckton, apterous viviparous female. A, head; B, siphunculus; C, cauda; D, 3rd antennal segment; E, mesosternal furca; F, hind tarsus and apical part of hind tibia; G, ultimate rostral segment.

with pale marginal sclerites; 2nd–4th segments with 6 or 7 setae between marginal sclerites; 8th with 5 setae. Siphunculi swollen at apical half, 2.1 times as long as cauda, with basal cylindrical part about 4.5 times as long as smallest breadth of the part.

Measurements in mm. Antennal segments (1st–6th): 0.30, 0.13, 1.44, 1.38, 1.02, 0.30+?; hind femur 1.95; hind tibia 3.83; 2nd segment of hind tarsus 0.16; ultimate rostral segment 0.16; siphunculus 0.85; cauda 0.39.

Fundatrix. Very much like the apterous viviparous female, differing in the following aspects:—

Antennae with 3rd segment bearing 5–14 rhinaria, and with processus terminalis about 3 times as long as base of 6th segment; 3rd–6th segments as 58:40:33:12+37 in length. Siphunculi 2.7–2.8 times as long as cauda which bears 11–15 setae. Body

3.2-3.9 mm. in length excluding cauda.

Measurements in mm. Body 3.20; head across eyes 0.74; antennal segments (1st-6th): 0.26, 0.12, 1.54, 1.06, 0.87, 0.31+0.96; ultimate rostral segment 0.15; hind femur 1.70; hind tibia 3.10; 2nd segment of hind tarsus 0.17; siphunculus 0.88; cauda 0.32.

Oviparous female. Distinguished from the apterous viviparous female by the following aspects:—

Body in life green or yellowish green; abdomen with 3 longitudinal brown stripes which are irregularly incised or cut by overhanging green area. Similar brown markings appear also in larvae. Body 3.0-3.7 mm. in length excluding cauda.

Antennae with 3rd segment bearing 3-9 rhinaria. Hind tibiae swollen on basal half bearing numerous pseudosensoria.

Measurements in mm. Body 3.52; head across eyes 0.75; antennal segments (1st-6th): 0.26, 0.13, 1.31, 1.11, 0.97, 0.32+1.34; ultimate rostral segment 0.16; hind femur 1.71; hind tibia 2.24; 2nd segment of hind tarsus 0.14; longest dorsal seta 0.06 on head, 0.02 on anterior part of abdomen, 0.06 on 8th abdominal segment.

Specimens examined: Many apterous viviparous females, Sapporo, Hokkaido, 22-vi-67, 22-ix-66, & 26-ix-67, ex *Athyrium yokoscense*, Sapporo, 6-ix-67, ex *Athyrium pycnosorum*, and Sapporo, 6-ix-67, ex *Lastrea quelpaertensis*; one alate viviparous female, Sapporo, 22-vi-67, ex *Athyrium yokoscense*; some fundatrices, Sapporo, 20-v-67, ex a fern, and Sapporo, 22-vi-67, ex *Athyrium yokoscense*; some oviparous females, Sapporo, 22-ix-66, 26-ix-67, & 20-x-67, ex *Athyrium yokoscense*, all the specimens are collected by M. Miyazaki.

Host plant: On the basis of the present material from Japan following ferns are given as hosts:— *Athyrium yokoscense*, *Athyrium pycnosorum*, and *Lastrea quelpaertensis*. Furthermore, according to the literature the following ferns are recorded as hosts:— (*Dryopteris dilatata*)=*Dryopteris austriace* (in Japan, after Matsumura, 1918), *Pteridium aquilinum* var. *latiusculum* (in Korea, after Paik, 1965), *Athyrium filix-femina* (in Europe, after Hille Ris Lambers, 1966), *Polystichum* sp. and *Asplenium* sp. (in Holland, after van der Goot, 1915), *Cystopteris montana* (in England, after Buckton, 1876).

Distribution: Japan; Korea; Europe.

This aphid completes its life cycle on ferns. In Sapporo the fundatrix appears at the end of May and the oviparous female is observed at the end of September.

Having compared the present specimens with authentic European specimens of *Amphorophora ampullata* Buckton, I have been convinced that they should be identified with *ampullata*. Dr. Hille Ris Lambers, having made a more comprehensive examination, also informed me that the Japanese specimens agree well with the European specimens of *ampullata*. The Japanese form is, however, slightly different from the European one in that the oviparous female has brown markings on the abdomen in life. In this respect the Japanese form is intermediate between *ampullata* and the North American form, *laingi* Mason. I have had the opportunity to examine some apterous viviparous specimens of *laingi* from U.S.A., which show only minor differences from the Japanese specimens. Although further informations are necessary to determine whether *laingi* is a distinct species or not, I tentatively follow Hille Ris Lambers (1966) in the opinion that *laingi* is a geographical form of *ampullata*.

The present specimens agree well with the original descriptions of *Megoura dryopteridis* Matsumura, 1918, and *Amphorophora shidae* Shinji, 1933. These descrip-

tions also agree in the greater part with the succeeding *Amphorophora scabripes*, sp. n., but are discrepant from the latter by the smaller number of rhinaria on the antennae. So I am much inclined to consider that both *dryopteridis* and *shidae* should be suppressed as synonyms of *ampullata*.

2. *Amphorophora scabripes*, sp. n.

Apterous viviparous female. Body in life pale green with a pair of longitudinal dark green stripes dorsally. Eyes black. Antennae pale; 3rd segment at apex and around rhinaria, 4th at apex, 5th at distal part and 6th fuscous. Legs pale brown; femora dark apically; tibiae at apex and tarsi black. Siphunculi pale, black at apex. Cauda pale or a little fuscous. Body 4.8–5.7 mm. in length excluding cauda.

Head with pointed setae at most about as long as middle breadth of 3rd antennal segment. Antennal tubercles large, parallel or slightly diverging, smooth, sometimes

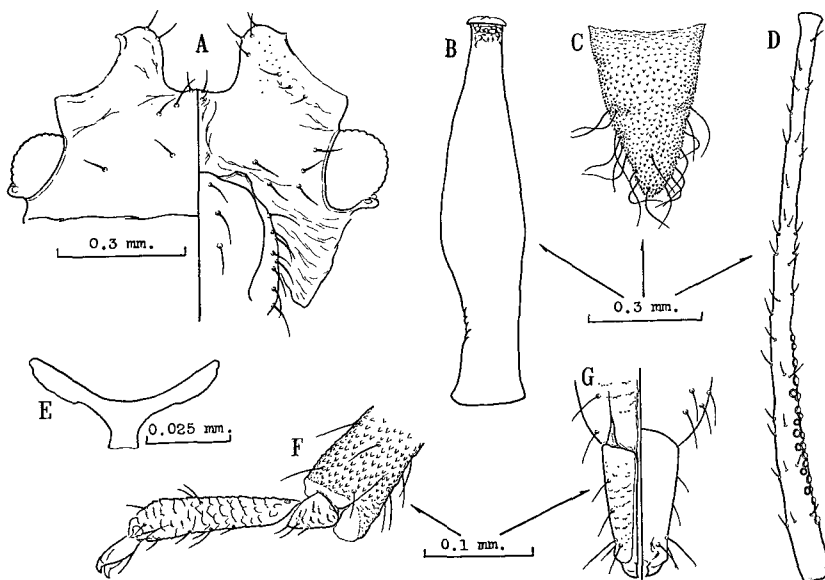


Fig. 2. *Amphorophora scabripes*, sp. n., apterous viviparous female. A, head; B, siphunculus; C, cauda; D, 3rd antennal segment; E, mesosternal furca; F, hind tarsus and apical part of hind tibia; G, ultimate rostral segment.

sparsely spinulated ventrally, with 2–4 setae apically and 1–3 setae ventrally, the ventral surface being rather flat. Antennae 1.1–1.4 times as long as body; basal 2 segments spinulose; 3rd segment smooth, with 19–27 rhinaria on basal 1/3–1/2, and with setae at most 2/3 as long as middle breadth of the segment; 6th segment with processus terminalis 4–5 times as long as base; 3rd–6th segments as 64:54:40:15+66 in length. Mandibular laminae with 8–11 setae; clypeus with 6–8 setae anteriorly. Rostrum reaching hind coxae; ultimate segment spinulose, 0.9–1.0 times as long as 2nd segment of hind tarsus, with 4–6 secondary setae. Femora scabrous on apical 2/3 or more, with pointed setae at most 2/5 as long as middle breadth of hind femur. Tibiae

spinulous on apical 1/6-1/5. Tarsi with 1st segment spinulous and bearing 3 (rarely 2 or 4) setae; 2nd segment 0.21-0.23 mm. in length, with 0-2 setae dorsally and 2-4 setae ventrally in addition to 3 pairs of apical ones. Mesosternal furca with stem not longer than broad. Abdomen membranous, smooth, without any ornamentation; 2nd-4th segments with 10-15 short blunt setae in addition to marginal ones; 7th with 12-16 setae in all; 8th with 10-14 setae, the longest seta being 0.8-1.5 times as long as middle breadth of 3rd antennal segment. Siphunculi smooth, corrugated at dark cylindrical area below distinct flange, swollen apically, broadest at middle, 2.0-2.4 times as long as cauda, 1/5-2/9 of body length, the basal cylindrical part being 1.7-2.8 times as long as smallest breadth of the part. Cauda thick and blunt, 1.4-1.6 times as long as broad, and with 15-20 pointed setae.

Measurements in mm. Body 4.83; head across eyes 1.04; antennal segments (1st-6th): 0.32, 0.15, 1.53, 1.29, 1.00, 0.39+1.85; ultimate rostral segment 0.21; hind femur 2.24; hind tibia 4.45; 2nd segment of hind tarsus 0.21; siphunculus 1.07; cauda 0.52; longest dorsal seta 0.05 on head, 0.04 on anterior part of abdomen, 0.06 on 8th abdominal segment.

Alate viviparous female. Differs from the apterous viviparous female as follows:—

Abdomen in life yellowish green. Head and thorax dark brown. Antennae black; 3rd segment except for apex and rhinariated area, and 4th segment basally pale. Femora pale with apex black. Siphunculi black with basal cylindrical part pale. Body 4.9-5.5 mm. in length excluding cauda.

Antennae with 3rd segment bearing 53-69 rhinaria along its whole length; 3rd-6th segments as 56:48:36:15+67 in length. Wings of normal venation, with some pointed setae on subcosta and on hind margin of stigma, the setae being about as long as middle breadth of 3rd antennal segment. Legs with hind femora scabrous on apical 1/2-2/3. Abdomen with pale marginal sclerites, without marginal tubercles.

Measurements in mm. Body 4.40; head across eyes 0.87; antennal segments (1st-6th): 0.30, 0.16, 1.51, 1.28, 0.93, 0.40+1.77; ultimate rostral segment 0.20; hind femur 2.12; hind tibia 4.35; 2nd segment of hind tarsus 0.20; siphunculus 1.00; cauda 0.41; longest dorsal seta 0.06 on head, 0.05 on anterior part of abdomen, 0.06 on 8th abdominal segment.

Specimens examined (syntypes): Some apterous viviparous females, Oirase (Towadachô), Aomori Pref., 25-viii-66, ex *Lastrea quelpaertensis*, M. Miyazaki leg.; some apterous and alate viviparous females, Sôbetsu, Hokkaido, 7-vii-67, ex *Lastrea quelpaertensis*, M. Miyazaki leg.

Host plant: *Lastrea quelpaertensis*.

Distribution: Japan.

This species is very closely related to *A. ampullata* Buckton, but is distinguished from the latter in the following points in addition to the characters given in the key:— (1) Abdomen with more setae, e.g. 8th segment with 10-14 setae. (2) Ultimate rostral segment comparatively shorter, 0.9-1.0 times as long as 2nd segment of hind tarsus, with fewer (4-6) secondary setae. (3) Tibiae scabrous with spinules at apex, not with imbrications as in *ampullata*, the spinules being scattered at least on apical 1/6. (4) Body larger, 4.8-5.7 mm. in length excluding cauda.

3. ***Macromyzus polypodicola*** (Takahashi)

Myzus polypodicola Takahashi, Aphididae of Formosa, part 1 (Pub. Agr. Exp. St. Formosa) p. 21, 1921.

Myzus polypodicola: Takahashi, Dept. Agr., Govt. Res. Inst. Formosa, Rept. 4: 82, 1923, Rept. 16: 18, 1925, and Rept. 53: 70, 1931; Shinji, Monogr. Japanese Aphididae p. 974, 1941.

Macrosiphum polypodicola: Takahashi, Deli Exp. St. Medan, Sumatra Rept. 24: 1, 1925.

Macromyzus polypodicola: Takahashi, Ins. Mats. 26(1): 56, 1963; Tao, Plant Protect. Bull. Taiwan 5(3): 168, 1963.

Specimens examined: Some apterous and alate viviparous females, Kawachinagano, Osaka Pref., 4-xi-61, Taishi, Osaka Pref., 26-vi-60, and Naze, Amami-Oshima, 7-iv-60, ex ferns, R. Takahashi leg. (all studied by Takahashi, 1963).

Host plant: Ferns. According to the literature the following ferns have been recorded as its hosts:— *Dryopteris arida* (in Formosa, after Takahashi, 1925 & 1931, and Tao, 1963; in Sumatra, after Takahashi, 1925), *Polystichum* sp. (in Formosa, after Tao, 1963).

Distribution: Japan; Formosa; Sumatra.

4. ***Macromyzus woodwardiae*** (Takahashi)

Myzus woodwardiae Takahashi, Aphididae of Formosa, part 1 (Pub. Agr. Exp. St. Formosa) p. 20, 1921.

Myzus woodwardiae: Takahashi, Dept. Agr., Govt. Res. Inst. Formosa Rept. 4: 28 & 82, 1923, and Rept. 53: 70, 1931; Shinji, Monogr. Japanese Aphididae p. 984, 1941.

Myzus woodwardiae hinoi Moritsu, Bull. Facul. Agr., Yamaguchi Univ. 3: 26, 1952.

Macrosiphum woodwardiae: Takahashi, Deli Exp. St. Medan, Sumatra Rept. 24: 3, 1925.

Macromyzus woodwardiae: Takahashi, Kontyû 28: 225, 1960; Tao, Plant Protect. Bull. Taiwan 5(3): 168, 1963.

Specimens examined: Many apterous viviparous females, Bandai-Kôgen, Fukushima Pref., 31-viii-66, ex a fern, M. Miyazaki leg., Nachi, Wakayama Pref., 19-x-66, ex *Rumohra mutica*, M. Miyazaki leg., Futaminoura, Mie Pref., 17-v-66, ex *Dryopteris monticola*, M. Miyazaki leg., Karasawa, Nagano Pref., 28-viii-67, ex a fern, H. Higuchi leg., and Mt. Daisen, Tottori Pref., 21-viii-67, ex a fern, H. Higuchi leg. Some apterous and alate viviparous females collected from ferns at Yokohama, Kanagawa Pref., 12-vii-53, & 20-i-54, K. Sato leg., Hirao, Osaka Pref., v-54, v-58, & xi-58, R. Takahashi leg., and Mt. Kongo, Osaka Pref., 21-vi-54. R. Takahashi leg. (studied by Takahashi, 1960).

Host plant: On the basis of the present material are given *Dryopteris monticola* and *Rumohra mutica* as hosts. In the literature, following hosts have been recorded:— *Dryopteris varia* (in Japan, after Moritsu, 1952), *Woodwardia* sp. and *Polystichum* sp. (in Formosa, after Takahashi, 1921, and Tao, 1963), *Woodwardia radicans* (in Formosa, after Takahashi, 1923).

Distribution: Japan; Formosa.

5. ***Micromyzodium polypodii*** Takahashi

Micromyzodium polypodii Takahashi, Ins. Mats. 26(1): 61, 1963.

Specimens examined: Many apterous and some alate viviparous females collected from ferns by R. Takahashi at following localities:— Hirao, Osaka Pref., 30-v-54, Mt. Kongo, Osaka Pref., 1-vi-68, Mt. Takao, Tokyo District, 24-vii-59, Mt. Tanzawa, Kana-

gawa Pref., 9-viii-61, and Mt. Mitake, Tokyo District, 25-vii-62 (studied by Takahashi, 1963).

Host plant: Ferns.

Distribution: Japan.

6. *Micromyzus nikkoensis*, sp. n.

Apterous viviparous female. Body whitish or pale yellow in life. Antennae black; basal 2 segments paler. Eyes black. Legs black; femora pale; tibiae a little lighter distally. Siphunculi pale with apex fuscous. Cauda pale. Body 1.5–1.7 mm. in length excluding cauda.

Head scabrous on dorsum except for posterior half and over venter; dorsal setae of head minute, 5–13 μ in length, and ventral ones longer, up to 20 μ . Antennal tubercles strongly protruding inwards and rounded at apex. Antennae imbricated,

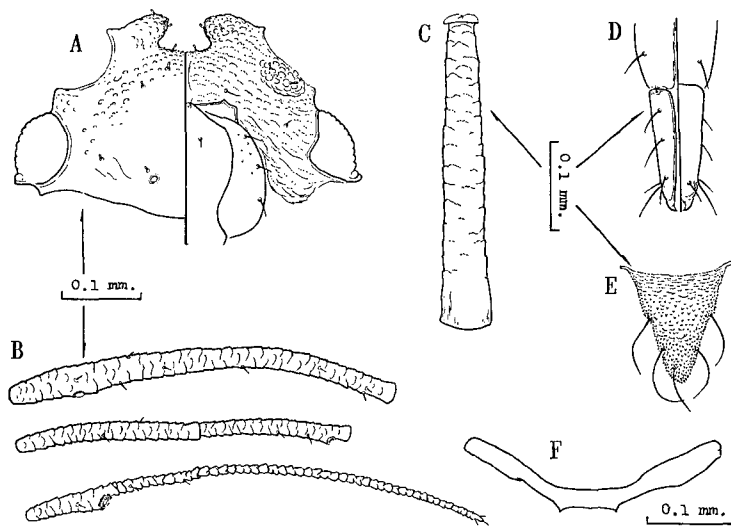


Fig. 3. *Micromyzus nikkoensis*, sp. n., apterous viviparous female. A, head; B, antenna (3rd-6th segments); C, siphunculus; D, ultimate rostral segment; E, cauda; F, mesosternal furca.

a little shorter to a little longer than body; 3rd segment distinctly longer than head across eyes, with 1 or 2 small rhinaria near base; processus terminalis 4–5 times as long as base of 6th segment; 3rd–6th segments as 45:23:17:10+41 in length. Mandibular laminae with 2–4 setae and a few spinules; clypeus smooth, with 2 pairs of setae anteriorly. Rostrum reaching hind coxae; ultimate segment 1.4–1.6 times as long as 2nd segment of hind tarsus, with 3 pairs of secondary setae. Mesosternal furca sessile. Femora imbricated apically, with setae up to 1/3–1/2 as long as middle breadth of hind femur; tibiae with setae shorter than middle breadth of hind tibiae; tarsi with 2nd segment bearing 2 dorsal and 2 ventral setae in addition to 3 pairs of apical ones; 1st tarsal chaetotaxy 3, 3, & 3. Abdomen with tergum sclerotic and wrinkled, without ornamentation; 2nd–4th segments usually with 4 setae in addition to marginal ones, the setae being about 6 μ in length; 6th with 4 setae between siphunculi; 7th with

5-8 setae in all; 8th with 2-5 setae which are up to 20-25 μ in length. Siphunculi imbricated, cylindrical, incised below well-developed flange, about 8 times as long as wide at middle, 2.3-2.8 times as long as cauda, much shorter than head across eyes. Cauda shortly triangular, about 1.4 times as long as wide at base, with 5 setae. Larvae without spinules on hind tibiae.

Some of the specimens examined are ovipariform with a few pseudosensoria on the hind tibiae while their bodies contain embryos.

Measurements in mm. Body 1.72; head across eyes 0.43; antennal segments (1st-6th): 0.09, 0.07, 0.52, 0.23, 0.19, 0.11+0.47; ultimate rostral segment 0.13; hind femur 0.51; hind tibia 0.98; 2nd segment of hind tarsus 0.09; siphunculus 0.34; cauda 0.13; dorsal setae of head 0.008-0.010, ventral setae of head 0.013-0.019, dorsal setae of anterior part of abdomen about 0.006, that on 8th abdominal segment 0.013-0.023.

Specimens examined (syntypes): Some apterous viviparous females, Kirifuri, Nikko, Tochigi Pref., 6-x-67, ex *Athyrium pycnosorum*, M. Miyazaki leg.

Host plant: *Athyrium pycnosorum*.

Distribution: Japan.

This species is very closely related to *M. osmundae* Takahashi, from which it differs in the following points:— Cauda shorter, about 1.4 times as long as broad; antennae longer, with 3rd segment distinctly longer than head across eyes and with processus terminalis 4-5 times as long as base of 6th segment (2.5-3.5 times so in *osmundae*); siphunculi shorter, about 8 times as long as broad at middle; head with ventral setae longer, 15-20 μ (at most 10 μ in *osmundae*).

7. *Micromyzus osmundae* Takahashi

Micromyzus osmundae Takahashi, Ins. Mats. 26(1): 59, 1963.

Specimens examined: A few apterous viviparous females, Karuizawa, Nagano Pref., 31-vii-61, ex *Osmunda claytoniana*, R. Takahashi leg. (studied by Takahashi, 1963).

Host plant: *Osmunda claytoniana*.

Distribution: Japan.

8. *Shinjia pteridifoliae* (Shinji)

Microtarsus pteridifoliae (sic) Shinji, Lansania 1(3): 44, 1929.

Microtarsus pteridifoliae: Shinji, Rept. Japan Assoc. for Advance. Sci. 5: 188, 1930; idem, Monogr. Japanese Aphididae p. 901, 1941; Tseng and Tao, Ent. and Phytopath. 4(7-9): 152, 1936.

Shinjia pteridifoliae (sic): Takahashi, Tenthredo 2(1): 6, 1938.

Shinjia pteridifoliae: Moritsu, Matsumushi 1(2): 94, 1946; idem, Bull. Fac. Agr., Yamaguchi Univ. 3: 25, 1952; Sorin, Kontyû 30(1): 21, 1962; Tao, Plant Protect. Bull. Taiwan 5(3): 163, 1963; Paik, Aphids of Korea p. 53, 1965; Eastop, Australian J. Zool. 14: 475, 1966.

Specimens examined: Fundatrices, Takachiho, Miyazaki Pref., 19-v-65, ex *Viburnum erosum*, M. Miyazaki leg., Osaka, 6-iv-61, ex *Viburnum dilatatum*, M. Sorin leg. Apterous viviparous females, Takachiho, 19-v-65, ex *Viburnum erosum*, M. Miyazaki leg.; Sapporo, 6-ix-67, M. Miyazaki leg., Lake Kamakita, Saitama Pref., 14-x-66, M. Miyazaki leg., and Osaka, 19-viii-55, M. Sorin leg., all from *Pteridium aquilinum* var. *latiusculum*. Alate males, Sapporo, 27-ix-67, ex *Pteridium aquilinum* var. *latiusculum*, H. Higuchi leg., and Osaka, 3-xi-60, ex *Viburnum dilatatum*, M. Sorin leg. Oviparous females, Osaka, 3-xi-60, ex *Viburnum dilatatum*, M. Sorin leg.

Host plant: As primary hosts of this aphid have been recorded *Viburnum dilatatum*

(by Sorin, 1962) and *V. japonicum* (by Moritsu, 1946). On this occasion *V. erosum* is given as the primary host. The secondary host is *Pteridium aquilinum* var. *latiusculum*.

Distribution: Japan; Korea; China; Australia; Nepal.

9. *Chaitophorus shidae* (Shinji)

Thomasia shidae Shinji, Zool. Mag. 34 (406): 732, 1922.

Chaitophorus shidae: Shinji, Iwate Mushi-no-kai Kaihō 1(1): 14, 1935.

Host plant: *Dryopteris crassirhizoma* (after Shinji, 1922).

Distribution: Japan.

As this species has not yet been known exactly to me, it is excluded from the present key.

10. *Utamphorophora filicis*, sp. n.

Apterous viviparous female. Body pale yellow in life. Eyes black. Antennae pale, dusky on distal half. Legs pale; tibiae at apex and tarsi black. Siphunculi pale, sometimes fuscous apically. Cauda pale. Body 1.2–1.7 mm. in length excluding cauda.

Head granulated, the disk being smooth, with minute blunt setae. Antennal tubercles well developed, rounded and strongly converging at apex. Antennae short, 0.6–0.7 times as long as body, strongly imbricated; 3rd segment about as long as 4th and 5th together, with 0–7 (mostly 1–3) rhinaria on basal part, and with 4–8 minute setae; 6th segment with processus terminalis 2.3–2.8 times as long as base; 3rd–6th segments as 24:12:13:8+21 in length. Mandibular laminae with some spinules and 1–3 short blunt setae; clypeus weakly granulated, with 4 setae anteriorly. Rostrum passing middle coxae or just attaining hind coxae; ultimate segment 1.1–1.4 times as long as 2nd segment of hind tarsus, with a pair of secondary setae. Femora imbricated on lower surface, with some short pointed or blunt setae; tibiae with setae at most as long as middle breadth of hind tibia; tarsi with 2nd segment bearing 0–2 setae dorsally and 2–4 setae ventrally in addition to 3 pairs of apical ones; 1st tarsal chaetotaxy 3, 3, & 3. Mesosternal furca sessile, not divided. Abdomen pale, corrugated, with minute blunt setae dorsally; 2nd–4th segments in most cases with spinal, pleural and marginal setae in single pairs respectively; 6th with 3 or 4 setae between siphunculi; 8th with 3–5 setae. Siphunculi swollen, rather smooth, weakly imbricated apically, wrinkled basally, 2.3–2.8 times as long as cauda, much shorter than head across eyes, with a developed flange. Cauda blunt, with or without constriction at middle, with 4 setae. Larvae without spinules on hind tibiae.

Measurements in mm. Body 1.39; head across eyes 0.37; antennal segments (1st–6th): 0.08, 0.06, 0.24, 0.12, 0.11, 0.08+0.20; ultimate rostral segment 0.10; hind femur 0.36; hind tibia 0.66; 2nd segment of hind tarsus 0.08; siphunculus 0.31; cauda 0.12; dorsal setae of head about 0.004, that on 8th abdominal segment about 0.005.

Alate viviparous female. Differs from the apterous viviparous female as follows:—

Abdomen in life dirty yellow, with developed black patches. Head and thorax black. Eyes dark brown. Antennae black. Legs black; femora pale at extreme base. Siphunculi and cauda pale. Body 2.0–2.2 mm. in length excluding cauda.

Head smooth dorsally, spinulose ventrally; antennal tubercles well developed, converging, imbricated apically and ventrally. Antennae about as long as or a little shorter than body; 3rd segment 1.2–1.4 times as long as 4th and 5th together, with 30–39 large

or small secondary rhinaria along its whole length; 4th with 4-6 secondary rhinaria; 5th usually without (rarely with 1) secondary rhinarium; processus terminalis 3.2-3.5 times as long as base of 6th segment; 3rd-6th segments as 66:28:21:10+35 in length. Ultimate rostral segment 1.3 times as long as 2nd segment of hind tarsus. Wing venation normal. Abdomen with large trapezoid median patch and developed marginal sclerites; marginal tubercles absent; 7th and 8th segments with sclerotic band. Siphunculi about twice as long as cauda which bears 4 or 5 setae.

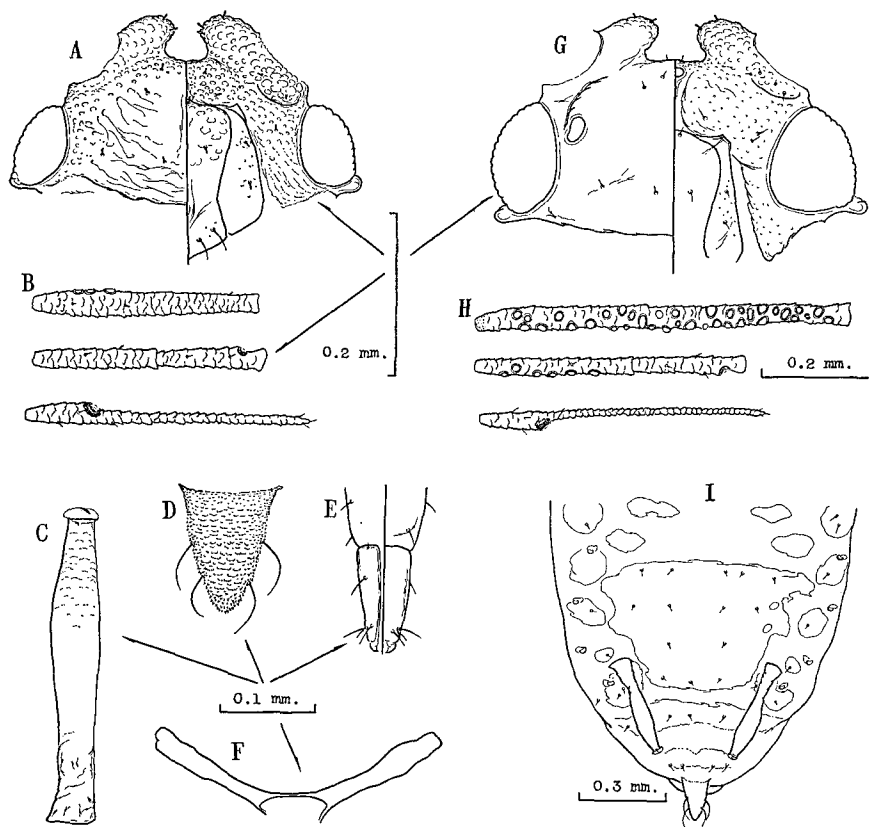


Fig. 4. *Utamphorophora filicis*, sp. n.

A-F: apterous viviparous female. G-I: alate viviparous female. A & G, head; B & H, antenna (3rd-6th segments); C, siphunculus; D, cauda; E, ultimate rostral segment; F, mesosternal furca; I, abdomen.

Measurements in mm. Body 2.16; head across eyes 0.46; antennal segments (1st-6th): 0.11, 0.07, 0.67, 0.31, 0.24, 0.13+0.42; ultimate rostral segment 0.12; hind femur 0.66; hind tibia 1.28; 2nd segment of hind tarsus 0.09; siphunculus 0.32; cauda 0.15; dorsal setae about 0.008 on head, 0.009-0.013 on anterior part of abdomen, 0.015-0.020 on 8th abdominal segment.

Alate male. Differs from the alate viviparous female as follows:—

Antennae a little longer than body; 3rd segment 1.2-1.3 times as long as 4th and 5th together, with 41-55 secondary rhinaria; 4th with 10-16 secondary rhinaria; 5th with 4-12 secondary rhinaria; 6th with processus terminalis 3.6-4.0 times as long as base; 3rd-6th segments as 66:32:25:13+51 in length. Tibiae pale with the base and apex black. Abdomen with median sclerotic patch smaller than in alate viviparous female. Siphunculi pale with apex dark, 2.2-2.4 times as long as cauda. Genitalia normal.

Measurements in mm. Body 1.65; head across eyes 0.42; antennal segments (1st-6th): 0.11, 0.07, 0.61, 0.28, 0.22, 0.11+0.40; ultimate rostral segment 0.12; hind femur 0.57; hind tibia 1.04; 2nd segment of hind tarsus 0.09; longest dorsal seta 0.014 on head, 0.011 on anterior part of abdomen, 0.015 on 8th abdominal segment.

Specimens examined (syntypes): Some apterous viviparous females, Sapporo, Hokkaido, 26-ix-67, ex *Athyrium yokoscense*, M. Miyazaki leg., Sukayu, Aomori Pref., 24-viii-66, ex a fern, M. Miyazaki leg., Yukomambetsu, Hokkaido, 30-vii-67, ex *Dryopteris austriaca*, M. Miyazaki leg. Some alate viviparous females, Sapporo, 26-ix-67, ex *Osmunda japonica*, M. Miyazaki leg. A few alate males, Sapporo, 26-ix-67, ex *Athyrium yokoscense*, M. Miyazaki leg.

Host plant: *Athyrium yokoscense*, *Dryopteris austriaca* and *Osmunda japonica*.

Distribution: Japan.

So far as I am aware, no species of the genus *Utamphorophora* Knowlton has hitherto been known to occur in Japan. Judging from the literature, the present species is much like *U. timpanogos* Knowlton, 1946, and *U. humboldti* (Essig, 1941), but is immediately distinguished from those species in that the body is pale yellow in life, with the siphunculi pale, and in that the antennae of the alate viviparous female have the 3rd segment bearing more (30-39) rhinaria and the 4th also bearing some (4-6) rhinaria.